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Agricultural machinery – Abaca Stripper – Methods of Test

BUREAU OF PRODUCT STANDARDS

DEPARTMENT OF TRADE & INDUSTRY PHILIPPINES

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National Foreword

This Philippine Agricultural Engineering Standards PAES 255:2011, Agricultural machinery – Abaca Stripper – Methods of Test was approved for adoption as Philippine National Standard by the Bureau of Product Standards upon the recommendation of the Agricultural Machinery Testing and Evaluation Center (AMTEC) and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development of the Department of Science and Technology (PCARRD-DOST).

Foreword

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) through the project "Development of Standards for Agricultural Production and Postharvest Machinery" funded by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development – Department of Science and Technology (PCARRD – DOST)

This standard has been technically prepared in accordance with PAES 010-2 – Rules for the Structure and Drafting of International Standards.

The word "shall" is used to indicate mandatory requirements to conform to the standard.

The word "should" is used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others.

In the preparation of this standard, the following documents/publications were considered:

PAES 229:2005 Agricultural Machinery – Fiber Decorticator – Methods of Test

Design and Development of an Improved Manual Extraction Process of Abaca Fiber in Northern Samar. Fiber Industry Development Authority (FIDA), Agricultural Machinery Testing and Evaluation Center (AMTEC) and Northern Samar Integrated Rural Development Project (NSIRDP)

CONTENTS

1 Scope

This standard specifies the methods of test and inspection for abaca stripper. Specifically, it shall be used to:

1.1 verify the mechanism, dimensions, materials, accessories of the abaca stripper and the list of specifications submitted by the manufacturer;

1.2 determine the performance of the machine;

1.3 evaluate the safety features; and

1.4 report the results of the tests.

2 References

The following normative documents contain provisions, which through reference in this text constitute provisions of this National Standard:

PAES 103:2000 Agricultural Machinery – Methods of Sampling

PAES 254:2010 Agricultural Machinery – Abaca Stripper – Specifications

3 Definitions

For the purpose of this standard, the definitions given in PAES 254 and the following shall apply:

3.1
stripping efficiency
ratio of the total dry weight (moisture content of 14%) of the fiber extracted to the potential fiber content of abaca tuxies, expressed in percent

3.2
extraction loss
difference between the potential fiber content of abaca tuxies and dry weight (moisture content of 14%) of the actual fiber extracted using abaca stripper, expressed in percent

3.3
fiber quality
refers to the physical properties such as tensile strength, length, color and texture (fineness and coarseness) of fibers extracted

3.4
grade
indicator of the quality or the characteristics of the physical property of a fiber

3.5
output capacity
fresh weight of the output fiber extracted from the abaca stripper per unit time, kg/h

3.6
overall height
distance between the horizontal supporting plane surface and the horizontal plane touching the uppermost part of the stripping machine

NOTE: All parts of the abaca stripper projecting upwards are contained between these two planes.

3.7
overall length
distance between the vertical planes at the right angles to the median plane of the abaca stripper and touching its front and rear extremities

NOTE: All parts of the stripper, in particular, components projecting at the front and at the rear are contained between these two planes. Where an adjustment of components is possible, it shall be set at minimum length.

3.8
overall width
distance between the vertical planes parallel to the median plane of the machine, each plane touching the outermost point of the stripper on its respective side

NOTE: All parts of the stripper projecting sidewards are contained between these two planes.

3.9
potential fiber content
summation of the weight of extracted fiber using manual or mechanical abaca stripper and unextracted fiber manually obtained

3.10
running-in period
preliminary operation of the machine to make various adjustments prior to the conduct of test until the operation is stable.

3.11
potential fiber recovery
ratio of fresh weight of fiber extracted and the total fresh weight of input abaca tuxies to the abaca stripper, expressed in percent

4 General Conditions for Test and Inspection

4.1 Selection of abaca stripper to be tested

Abaca stripper submitted for test shall be sampled in accordance to PAES 103.

4.2 Role of manufacturer/dealer

The manufacturer/distributor shall submit specifications and other relevant information about the abaca stripper and shall abide with the terms and conditions set forth by an official testing agency.

4.2 Role of the operator

An officially designated operator shall be skilled and shall demonstrate, operate, adjust, and repair as the case maybe, related to the operation of the abaca stripper.

4.3 Test site conditions

The abaca stripper shall be tested as installed for normal operation. The site should have ample provisions for material handling, temporary storage, workspace and suitable for normal working condition.

4.4 Test instruments

The instrument to be used shall be calibrated and checked by the testing agency prior to the measurements. The suggested list of minimum test instruments and materials needed to carry out the abaca stripper test is shown in Annex A.

4.5 Test materials

Abaca to be used shall be commonly or locally grown. It shall be cleaned and tuxied. The amount of test material to be supplied shall be at least 75% of output capacity (kg/h) of abaca stripper.

4.6 Termination of Test

If there is major component breakdown during testing, the test engineer from the official testing agency shall terminate the test.

5 Test and Inspection

5.1 Verification of the technical data and information of the manufacturer

5.1.1 This inspection is carried out to verify the mechanism, dimensions, materials and accessories of the abaca stripper in comparison with the list of technical data and information of the manufacturer.

5.1.2 A plane level surface shall be used as reference plane for verification of the dimensional specifications of the abaca stripper.

5.1.2 The items to be inspected and verified shall be recorded in Annex B.

5.2 Performance test

5.2.1 This is carried out to obtain and validate data on overall abaca stripper performance.

5.2.2 Data on abaca such as type, variety and source shall be recorded.

5.2.3 Test materials to be used.

Test materials prepared to be used for the running-in and for each test trial shall have the same characteristics and conditions.

5.2.4 Running-in and preliminary adjustment

Before the start of the test, the stripping machine should have undergone running-in period wherein various adjustments of the machine shall be made according to the recommendation of the manufacturer.

5.2.5 Operation of the abaca stripper

Stripping machine shall be operated at the speed and feed rate recommended by the manufacturer. The same recommended feeding rate shall be maintained during test run. After the test run, the area and the stripping machine shall be cleaned and then prepared for the next trial. The procedure shall be repeated for the succeeding test trials.

5.2.6 Test trial

There shall be a minimum of three test trials.

5.2.7 Data collection

5.2.7.1 Duration of test

The duration of each test trial shall commence at the start of the stripping operation and ends after feeding of the last batch of abaca tuxies and it shall be recorded as operating time.

5.2.7.2 For Mechanical Abaca Stripper

5.2.7.2.1 Noise level

The noise emitted by the machine shall be measured using a noise level meter at the location of the operator. The noise level shall be measured 50 mm away from the ear level of the operator.

5.2.7.2.2 Speed of components

The speed of the rotating components (e.g. prime mover shaft, spindle, flywheel) shall be taken using tachometer.

NOTE: Measurements shall be taken with and without load for sub-clauses 5.2.7.2 and 5.2.7.3 as specified in Annex C.

5.2.7.2.3 Energy/Fuel consumption

A power meter shall be used to measure electric energy consumption. In case an internal combustion engine is used, the fuel tank shall be filled to its capacity. After each test trial the tank shall be refilled using graduated cylinder. The amount of refueling is the fuel consumption for the test

5.2.7.3 For Manual Abaca Stripper

Height, weight, age and stature of the operator shall be recorded. Pulse rate and blood pressure before and after each test trial shall be recorded.

5.2.7.4 Data recording and observations

Record sheet for all data and information during the test is given in Annex C.

5.2.8 Sampling

5.2.8.1 Sampling for test materials

Before the start of each test trials, take at least ten representative samples of abaca tuxies for determination of material condition (i.e. size, moisture content)

5.2.8.2 Sampling for potential fiber content

Three samples each consisting of 5 to 7 tuxies (for spindle type) and 1 to 3 tuxies (for *"hagotan"*) shall be collected. The samples shall undergo extraction of fiber using mechanical or manual abaca stripper. The unextracted fiber from the tuxies shall be manually obtained.

5.2.8.3 Sampling from extracted fiber

During each test trial, three samples each weighing approximately 10 kg shall be randomly collected to be analyzed in the laboratory. One half of each sample shall be used for laboratory analysis of the physical quality of fiber and the other half shall be used for reference purpose or for an eventual second check in case of review.

5.2.8.4 Handling of samples

All samples shall be placed in appropriate containers and properly labeled.

5.3 Performance after test

5.3.1 Welded parts/joints shall be observed for detachments.

5.3.2 Bolted joints and parts shall be observed.

5.3.3 Moving parts shall be observed for malfunctions.

6 Laboratory Analyses

Laboratory analyses shall be made to determine the processing efficiency of the abaca stripper. The laboratory test data sheet to be used is given in Annex D.

6.1 Morphological properties

Measure and record the dimensions, i.e. length and thickness of the abaca tuxies.

6.2 Moisture content

This shall be determined using oven-dry method

6.2.1 For each test trial, select three-100 g abaca tuxies, place in the moisture can and record the weight. Ensure that no moisture is lost or gained by the samples between the time it was collected and when it is weighed in a moisture can. Record the initial weight.

6.2.2 Dry the samples in the oven with a temperature of 105°C ± 1°C for 72 hours.

6.2.3 After removing the samples from the oven, the container with the samples should be placed in a dessicator and allowed to cool to ambient temperature.

6.2.4 Weigh each mositure cans plus dried sample. Record the final weight. Calculate the moisture content using the equation in Annex E.

6.3 Potential fiber content

6.3.1 Clean the extracted fiber using manual or mechanical abaca stripper and mechanically dry until its moisture content is about 13% - 14%. Weigh the dried fiber and record the data.

6.3.2 The same procedure in 6.3.1 shall be done on the unextracted fiber.

6.3.3 Get the summation of the dry weights (moisture content of 14%) of the fiber exctracted using the manual or mechanical stripper and the unextracted fiber manually obtained. This will be the potential fiber content of the abaca tuxies.

6.4 Fiber quality

The quality of the fiber extracted shall be evaluated using the existing grading system of abaca fibers.This test shall be done by Fiber Industry Development Authority (FIDA).

7 Formula

The formula to be used during calculations and testing are given in Annex E.

8 Test Report

The test reports shall include the following information in the order given:

8.1 Title

8.2 Summary of Results

8.3 Purpose and Scope of Test

8.4 Methods of Test

8.5 Description of the Machine

Table 1 – Machine Specifications

8.6 Results and Discussions

8.7 Observations (include pictures)

Table 2 – Performance test data

8.8 Names, signatures and designation of test engineers

Annex A

Suggested Minimum List of Field and Laboratory Test Instruments and Materials

A.1	**Instruments**	**Quantity**
A.1.1	**Field**	
A.1.1.1	Tachometer	1
A.1.1.2	Timers	2
A.1.1.3	Tape measure (with maximum length of 5m)	1
A.1.1.4	Noise level meter Range: 30 dB(A) to 130 dB(A)	1
A.1.1.5	Weighing scale (capacity: 100 kg) Scale division: 0.5 kg	1
A.1.1.6	Graduated cylinder (for engines) (500 mL capacity)	1
A.1.1.7	Power meter (for electric motors) 60 Hz, 220 V	1
A.1.1.8	Spygmomanometer	1
A.1.1.9	Psychrometer	1
A.1.1.9	Thermometer	1
A.1.1.10	Digital camera	1
A.1.1.11	Vernier caliper (0.05 mm accuracy, 200 mm length)	1
A.1.2	**Laboratory**	
A.1.2.1	Weighing scale (sensitivity: 0.1g)	1
A.1.2.2	Air oven	1
A.1.2.3	Desiccator	1
A.1.2.4	Vernier caliper (0.05 mm accuracy, 200 mm length)	1
A.1.2.5	Foot ruler (graduation 1 mm)	1
A.1.2.5	Aluminum moisture cans	9
A.2	**Materials**	
A.2.1	Sample bags	
A.2.2	Labeling tags which include	
A.2.2.1	Date of test	
A.2.2.2	Stripper on test	
A.2.2.3	Sample before stripping	
A.2.2.4	Sample after stripping	
A.2.2.5	Trial number	

Annex B

Specifications of Abaca Stripper

Name of Applicant/ Distributor: _____
Address: _____
Tel No: _____
Name of Manufacturer: _____
Address: _____
Tel No: _____

GENERAL INFORMATION

Make: _____ Type: _____
Serial No: _____ Brand/Model: _____
Production date of Abaca stripper: _____
Testing Agency: _____ Test Engineer: _____
Date of Test: _____ Location of Test: _____

Items to be inspected

ITEMS	Specification of the Manufacturer	Verification by the Testing Agency
B.1 Main Structure		
B.1.1 Material(s) of construction		
B.1.2 Overall dimensions, mm		
B.1.2.1 length		
B.1.2.2 width		
B.1.2.3 height		
B.1.3 weight of machine, kg		
B.2 Spindle stripping machine		
B.2.1 Knife		
B.2.1.1 Material(s) of construction		
B.2.1.4 Dimensions, mm		
B.2.1.4.1 length		
B.2.1.4.2 width		
B.2.1.4.3 thickness		
B.2.1.5 Mode of attachment		
B.2.2 Stripping block		
B.2.2.1 Material(s) of construction		
B.2.2.2 Dimensions, mm		
B.2.2.2.1 length		
B.2.2.2.2 width		
B.2.2.2.3 thickness		
B.2.2.3 Mode of attachment		

B.2.3 Pedals (Clutch and Stripping)		
B.2.3.1 Material(s) of construction		
B.2.3.2 Dimensions, mm		
B.2.3.2.1 length		
B.2.3.2.2 width		
B.2.3.2.3 height from ground		
B.2.4 Flywheel		
B.2.4.1 Material(s) of construction		
B.2.4.2 Weight, kg		
B.2.4.3 Dimensions, mm		
B.2.4.3.1 Diameter		
B.2.4.3.2 Thickness		
B.2.4.3.3 Height from the ground		
B.3 Manual Stripping Device ("Hagotan")		
B.3.1 Presence of adjusting device for blade		
B.3.2 Knife		
B.3.2.1 Material(s) of construction		
B.3.2.2 Dimensions, mm		
B.3.2.2.1 length		
B.3.2.2.2 width		
B.3.2.2.3 thickness		
B.3.2.3 Serration, teeth per inch		
B.3.2.4 Mode of attachment		
B.3.3 Stripping block		
B.3.3.1 Material(s) of construction		
B.3.3.2 Dimensions, mm		
B.3.3.2.1 length		
B.3.3.2.2 width		
B.3.3.2.3 thickness		
B.3.3.3 Mode of attachment		
B.3.4 Lift Pedal		
B.3.4.1 Material(s) of construction		
B.3.4.2 Dimensions, mm		
B.3.4.2.1 length		
B.3.4.2.2 width		
B.3.4.2.3 height from ground		
B.3.5 Pulling aid		
B.3.5.1 Material(s)		
B.3.5.2 Dimenions, mm		
B.3.5.2.1 diameter		
B.3.5.2.2 length		
B.4 Safety device(s)		

B.5 Other special feature(s)		
B.6 Prime mover		
B.6.1 Internal Combustion Engine		
B.6.1.1 Brand		
B.6.1.2 Model		
B.6.1.3 Make or manufacturer		
B.6.1.4 Serial number		
B.6.1.5 Type		
B.6.1.6 Rated power, kW		
B.6.1.7 Rated speed, rpm		
B.6.1.8 Cooling system		
B.6.1.9 Starting system		
B.6.1.10 Weight, kg		
B.6.2 Electric Motor		
B.6.2.1 Type of motor		
B.6.2.2 Brand		
B.6.2.3 Make or manufacturer		
B.6.2.4 Serial number		
B.6.2.5 Rated power, kW		
B.6.2.6 Rated speed, rpm		
B.6.2.7 Frequency, Hz		
B.6.2.8 Voltage, V		

Annex C

Performance Test Data Sheet

Test Trial No. _____ Date: _____
Test Engineer: _____ Location: _____
Assistants: _____ Test Specimen: _____
Test Requested by: _____ Manufacturer: _____

	Trials			Ave
	I	II	III	
C.1 Test Materials				
C.1.1 Variety				
C.1.2 Source				
C.1.3 Weight, kg				
C.1.3.1 Stalk				
C.1.3.2 Tuxies				
C.2 Ambient Condition				
C.2.1 Temperature, °C				
C.2.1.1 Wet-bulb temperature				
C.2.1.2 Dry-bulb temperature				
C.3 Physical attribute of operator (for manually operated abaca stripper)				
C.3.1 Height, m				
C.3.2 Weight, kg				
C.3.3 Age, years				
C.3.4 Pulse rate, bpm				
C.3.4.1 before				
C.3.4.2 after				
C.3.5 Blood pressure, mmHg (systolic over diastolic)				
C.3.5.1 before				
C.3.5.2 after				
C.4 Weight of output, kg				
C.4.1 wet				
C.4.2 dry				
C.5 Operating time, h				
C.6 Output capacity, kg/h				
C.7 Tuxy fiber recovery, %				
C.8 Stalk fiber recovery, %				
C.9 Speed of components, rpm				
C.9.1 Spindle				
C.9.1.1 Without load				
C.9.1.2 With load				

C.9.2 Flywheel				
C.9.2.1 Without load				
C.9.2.2 With load				
C.9.2 Prime mover				
C.9.2.1 Without load				
C.9.2.2 With load				
C.9.6 Noise level, dB(A)				
C.9.6.1 Without load				
C.9.6.2 With load				
C.10 Electric Motor				
C.10.1 Power, kW				
C.10.1.1 Without load				
C.10.1.2 With load				
C.10.2 Current, A				
C.10.2.1 Without load				
C.10.2.2 With load				
C.10.3 Voltage, V				
C.10.3.1 Without load				
C.10.3.2 With load				
C.11 Internal Combustion Engine				
C.11.1 Engine time of operation, min				
C.11.2 Fuel consumed, L				
C.11.3 Fuel consumption, L/h				
C.12 Welding Acceptance Test				
C.12.1 Crack prohibition				
C.12.2 Weld/base-metal fusion				
C.12.3 Crater cross section				
C.12.4 Weld profile				
C.12.5 Time of inspection				
C.12.6 Undersize welds (if any)				
C.12.7 Undercut				
C.12.8 Porosity				

	Trial			**Ave**
	I	**II**	**III**	
C.13 Potential fiber content				
C.13.1 Weight of extracted fiber, g				
C.13.1.1 Fresh weight				
C.13.1.2 Dry weight (moisture content of 14%)				
C.13.2 Weight of unextracted fiber, g				
C.13.2.1 Fresh weight				
C.13.2.2 Dry weight (moisture content of 14%)				
C.13.3 Potential fiber content (C.11.1.2 + C.11.2.2)				

C.14 Evaluate the following observations:

Items	Remarks
C.14.1 Ease of loading	
C.14.2 Ease of cleaning parts	
C.14.3 Ease of adjusting parts	
C.14.4 Ease of repairing of parts	
C.14.5 Ease of collecting output	
C.14.6 Ease of operation	
C.14.7 Safety	
C.14.9 Ease of transporting the machine	

C.15 Other Observations:

Annex D

Laboratory Test Data Sheet

Machine Tested:_____ Analyzed by:_____
Date of Test: _____ Date Analyzed: _____

D.1 Characteristics of fiber samples

Items	Trial			Average
	I	II	III	
D.1.1 Moisture content, %				
D.1.1.1 Initial weight, g				
D.1.1.2 Final weight, g				
D.1.2 Fiber grade (FIDA Standards)				

D.2 Other physical observations on fiber:

_____
_____
_____
_____
_____

Annex E

Formula

E.1 Moisture Content

$$MC_{wb} = \frac{W_i - W_f}{W_i} \times 100$$

where:

MC_{wb} = moisture content, %
W_i = initial mass of the sample, g
W_f = final mass of the sample, g

E.2 Potential Fiber Recovery

$$R_f = \frac{W_{ffe}}{W_{tu}} \times 100$$

where:

R_f = fiber recovery, %
W_{ffe} = fresh weight of the extracted fiber, kg
W_{tu} = fresh weight of the abaca tuxies, kg

E.3 Output Capacity

$$C_o = \frac{W_{fe}}{To}$$

where:

C_o = output capacity, kg/h
W_{fe} = fresh weight of the fiber extracted, kg
T_o = total operating time, h

E.4 Fuel Consumption Rate

$$F_r = \frac{Fc}{T_e}$$

where:

F_r = fuel consumption rate, L/h
F_c = amount of fuel consumed, L
T_e = engine operating time, h

E.5 Stripping Efficiency

$$Eff_s = \frac{W_{dfe}}{W_{pfc}} \times 100$$

where:

Eff_s = stripping efficiency, %
W_{dfe} = weight of dried (moisture content of 14%) extracted fiber, kg
W_{pfc} = weight of potential fiber content, kg

E.6 Extraction Loss

$$L_e = \left(1 - \frac{W_{dfe}}{W_{pfc}}\right) \times 100$$

where:

L_e = extraction loss,
W_{dfe} = weight of dried (moisture content of 14%) extracted fiber, kg
W_{pfc} = weight of potential fiber content, kg

E.7 Coversion factors:

Power: 1 kW = 1.341022 horsepower
Speed: rpm to linear speed (m/s)

$$S_L = \frac{2\Pi r \times rpm}{60}$$

where:

S_L = linear speed
Π = 3.14159265
r = radius, m
rpm = rotational speed, revolution per min

Philippine Agricultural Engineering Standards

AMTEC-UPLB – PCARRD Project: "Development of Standards for Agricultural Production and Postharvest Machinery"

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